Problems Solved:

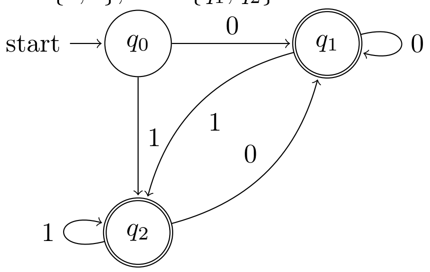
6	7	8	9	10

Name:

Matrikel-Nr.:

Problem 6. Let $N = (Q, \Sigma, \delta, S, F)$ be the NFSM given by $Q = \{q_0, q_1, q_2\}$, $\Sigma = \{0, 1\}$, $S = \{q_0\}$, $F = \{q_1, q_2\}$, and the transition function $\delta : Q \times \Sigma \to P(\Sigma)$ where $\delta(q_0, 0) = \{q_0, q_1\}$, $\delta(q_0, 1) = \{q_0, q_2\}$, and $\delta(q, \sigma) = \emptyset$ for $q \in \{q_1, q_2\}$ and all $\sigma \in \Sigma$. Construct a DFSM D such that $L(N) = L(D)$. *H*int: Use the Subset Construction, cf. Section 2.2 in the lecture notes.

Problem 7. Let the DFSM $M = (Q, \Sigma, \delta, q_0, F)$ be given by $Q = \{q_0, q_1, q_2\}$, $\Sigma = \{0, 1\}$, $F = \{q_1, q_2\}$ and the following transition function $\delta : Q \times \Sigma \to Q$:



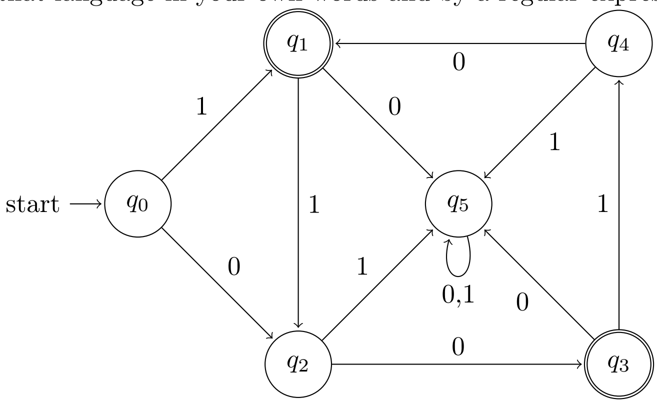
Construct a minimal DFSM D such that $L(M) = L(D)$ using Algorithm MINIMIZE. (cf. Section 2.3 *Minimization of Finite State Machines*)

Problem 8. Construct a nondeterministic finite state machine for:

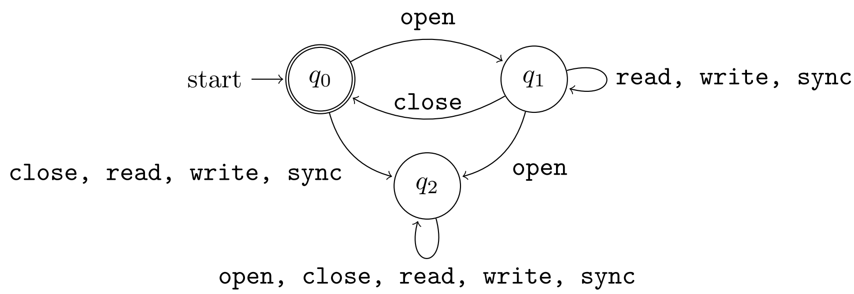
1. the language L_1 of all strings over $\{0, 1\}$ that contain 001 as a substring.
2. the language L_2 of all strings over $\{0, 1\}$ that contain the letters 0, 0, 1 in exactly that order. (Note that before, in between and after these three letters any number of other letters may occur).

Your two machines must not use more than 4 states. Moreover, they should only differ in their transition functions. Draw their transition graphs.

Problem 9. What language is accepted by the DFSM depicted below? Describe that language in your own words and by a regular expression.



Problem 10. What is the language $L(M)$ of the following deterministic finite-state machine M



over the alphabet $\Sigma = \{\texttt{open}, \texttt{close}, \texttt{read}, \texttt{write}, \texttt{sync}\}$? Give a regular expression r such that $L(M) = L(r)$.